WHAT IS CLAIMED IS:

1. A method for visually locating and tracking an object through a space, comprising the steps of:

choosing a plurality of modules for restricting a search function within the space to a plurality of regions with a high probability of significant change, the search function operating on images supplied by a camera;

deriving statistical models for errors, including quantifying an indexing step performed by an indexing module, and tuning system parameters; and

applying a likelihood model for candidate hypothesis evaluation and object parameters estimation for locating the object.

2. The method of claim 1, wherein the step of choosing the plurality of modules further comprises the steps of:

applying a calibration module for determining a static scene;

applying an illumination-invariant module for tracking image transformation; and

applying the indexing module for selecting regions of interest for hypothesis generation.

3. The method of claim 2, further comprising the

steps of:

applying a statistical estimation module for estimating a number of objects and their positions; and

applying a foveal camera control module for estimating a plurality of control parameters of a foveal camera based on location estimates and uncertainties.

4. The method of claim 2, further comprising the step of applying a background adaptation module for detecting and tracking the object in dynamically varying illumination situations.

5. The method of claim 1, wherein each module is application specific based on a plurality of prior distributions for imposing restrictions on a search function.

6. The method of claim 5, wherein the plurality of prior distributions comprise:

an object geometry model;

a camera geometry model;

a camera error model; and

an illumination model.

7. The method of claim 1, wherein the camera is an omnicamera.

8. The method of claim 1, wherein the object is tracked using a foveal camera.

9. The method of claim 1, wherein the step of deriving statistical models is applied a plurality of times to achieve a given probability of misdetection and false alarm rate.

10. The method claim 9, further comprising the step of validating a theoretical model for the space monitored for determining correctness and closeness to reality.

11. The method of claim 1, wherein the indexing module selects a plurality of regions with a high probability of significant change, motivated by a plurality of two dimensional image priors induced by a plurality of prior distributions in the space, wherein the space is three dimensional.

12. The method of claim 1, wherein the step of applying a likelihood model further comprises the step of estimating an uncertainty of the object's parameters for predicting a system's performance and for automating control of the system.

13. The method of claim 1, employed in an automobile wherein the space monitored comprises one of an interior compartment of the automobile and an exterior of the automobile.

14. A computer program product comprising computer program code stored on a computer readable storage medium for, for locating and tracking objects through a space, the computer program product comprising:

computer readable program code for causing a computer to choose a plurality of modules for a restricting search functions within a context to a plurality of regions with a high probability of significant change within the space;

computer readable program code for causing a computer to derive statistical models for errors, including quantifying an indexing step, and tuning system parameters; and

computer readable program code for causing a computer to apply a likelihood model for candidate hypothesis evaluation and object parameters estimation for locating the object.